

REMARKS

Applicant thanks the Examiner for his thoughtful review of the application. The status of the present application is as follows:

- a. **Claims 1 – 5, 8 – 14, and 19 - 31** are pending; and
- b. **Claims 6 – 7 and 15 – 18** have been **Cancelled**.

i. **ARGUMENT**

a. **Rejection of Claims 1 – 31 under 35 U.S.C. § 102(e) (U.S. 6,759,249 to Zhuang)**

Independent **Claims 1** and **28** are not anticipated under **35 U.S.C. § 102(e)** in view of the cited sections of *Zhuang* because all of the claim limitations are not explicitly or inherently disclosed in the cited sections of *Zhuang*. First, the interface between the amorphous PCMO layer 16b and the top electrode 18 as disclosed in *Zhuang* (see Col. 3, lines 34 – 44 and Fig. 1) do not inherently or explicitly include a top interface including at least one treatment primarily directed towards changing properties of the top interface, and the top interface is change by the treatment. Second, none of the cited sections of *Zhuang* inherently or explicitly disclose a bottom interface between the bottom electrode 14 and the nano-crystal layer 16a (see Fig. 1 of *Zhuang*) including at least one treatment primarily directed towards changing properties of the bottom interface and the bottom interface is change by the treatment.

It is well understood in the microelectronics art that an interface created by the joining of two dissimilar films, for example, a metal (e.g., platinum Pt) and a crystalline conductive metal oxide (e.g., PCMO) creates physically distinct and very thin interface layer having a thickness that is approximately 30 Å or less. Furthermore, the thin interface layer has structural differences that differentiate it from the structure of the films that adjoin the interface layer. The structural difference can be a compositional stoichiometry that is dissimilar to the compositional stoichiometry of the films that adjoin

it, a lattice structure that is different than the adjoining films, or both. One of the definitive texts on semiconductor physics describes a metal-semiconductor interfacial layer as one that is "assumed to have a thickness of a few angstroms" (see S. M. Sze, "Physics of Semiconductor Devices", 2nd Edition, pp 272 – 273). It is assumed that the Examiner largely agrees with this description, as the Examiner stated that "an interface is defined as a surface forming a common boundary between adjacent regions, bodies, substances or phases" (see Page 11 of the Final Office Action mailed 08/02/2006).

Accordingly, the Applicant must respectfully disagree as to the Examiner's description of a treatment being disclosed by *Zhuang* in Col. 3, lines 13 – 33 (see Pages 3, 4, 5, 8, 10 and 11 of the Final Office Action mailed 08/02/2006). In Col. 3, lines 13 – 33 *Zhuang* discloses multiple layers of PCMO 16 that are spin deposited over a platinum (Pt) layer 14. The Pt layer 14 has a thickness between about 100 nm to 200 nm and each layer of the spin deposited PCMO has a thickness between about 100 nm to 300 nm. Each 100 nm to 300 nm layer is described as being deposited in such a way as to effect bulk film properties. Absolutely no special interfacial treatment is described anywhere in the cited section.

It is noted that the claims describe a treatment that is "primarily directed" towards changing the interfacial property. Clearly, if "primarily directed" interfacial treatments are to have any meaning whatsoever, they must exclude treatments that effect the entire bulk films. The Examiner's analysis completely ignores the phrase "primarily directed. ("because *Zhuang* et al. teaches (Col. 3, Lines 13-33) that layers 16 are treated in various ways and are changed by this treatment (Col. 3, Lines 34-37) (Col. 7, Lines 39-42), that *Zhuang* et al. does indeed disclose the interface including the treatment and being changed by the treatment." (See Page 12 of the Final Office Action mailed 08/02/2006).)

Accordingly, the only interpretation is that the Examiner incorrectly identifies each separate layer of the spin deposited PCMO (i.e., 16b in Fig. 1 of *Zhuang*) as constituting an interface between the preceding PCMO layer and the platinum layer. However, this interpretation of the term "interface" is non-standard and contrary to the specific wording in the claims. For example, the claims describe a "top interface created by the direct

physical contact between the bottom surface of the top electrode and the top surface of the multi-resistive state element." It is well understood that in microelectronic fabrication, if two surfaces are separated by a 100-300 nm layer, they are not in direct physical contact.

Consequently, for at least the reasons argued above, independent **Claims 1 and 28** are not anticipated by, are patentably distinct, and are non-obvious in view of the cited sections of *Zhuang*. Therefore, the rejections of independent **Claims 1 and 28** under 35 U.S.C. § 102(e) in view of the cited sections of *Zhuang* ought to now be withdrawn.

For at least the same reasons as argued above for independent **Claims 1 and 28**, dependent **Claims 2 – 5, 8 – 14, 19 – 27, and 29 – 31** inherit all of the limitations of their respective independent claims and are not anticipated by, are patentably distinct, and are non-obvious in view of the cited sections of *Zhuang*. Therefore the rejections of dependent **Claims 2 – 5, 8 – 14, 19 – 27, and 29 – 31** under 35 U.S.C. § 102(e) in view of the cited sections of *Zhuang* ought to now be withdrawn.

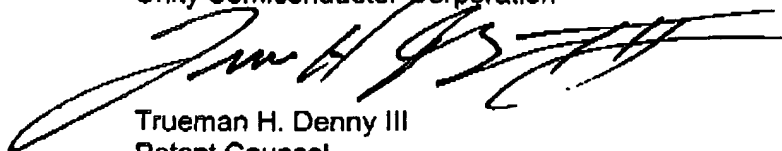
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iv. CONCLUSION

Applicant now believes the present case to be in condition for allowance, and respectfully requests a Notice of Allowance for this application from the Examiner. Should the Examiner believe that a telephone conference would expedite the prosecution of this application the undersigned can be reached at (408) 737-7200 x124.

Respectfully submitted,
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